

Toward Fine Strip Pitch Germanium Detectors in Space

Completed Technology Project (2017 - 2019)



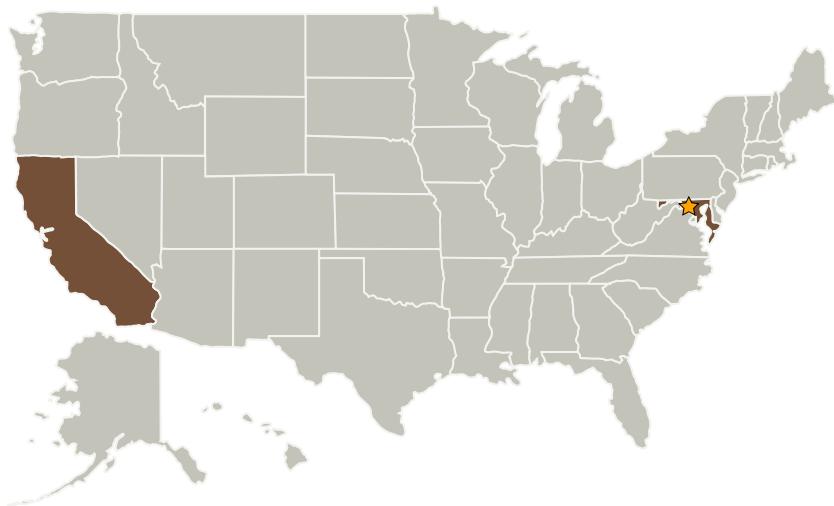
Project Introduction

Place Germanium detectors (GeDs) in a few-MeV γ -ray Compton instrument on a satellite will enable unprecedented insight into nuclear astrophysics, key multimessenger synergies, including with X-rays and gravitational waves, and new heliophysics applications. GeDs, now demonstrating $\sim 100\times$ improvement in measurement capabilities, require a low noise cryocooler system with sufficient thermal control for operation in space. We will develop and characterize such a cryocooler system using low cost, commercial parts now available.

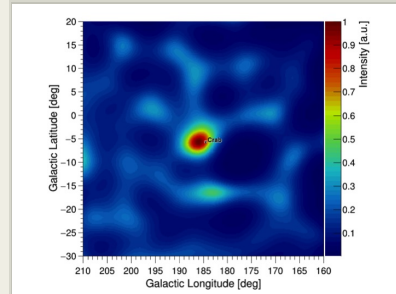
Anticipated Benefits

This project will benefit high energy and multimessenger astrophysics by allowing increased detector performance. The cryocooler activities may also prove a resource for detectors at other wavelengths, such as infrared.

Primary U.S. Work Locations and Key Partners



| Organizations Performing Work | Role | Type | Location |
|--------------------------------------|-------------------------|-------------|----------------------|
| ★Goddard Space Flight Center(GSFC) | Lead Organization | NASA Center | Greenbelt, Maryland |
| UC Berkeley Space Science Laboratory | Supporting Organization | Academia | Berkeley, California |



The first COSI Image of the Crab Nebula (Kierans, et al 2017).

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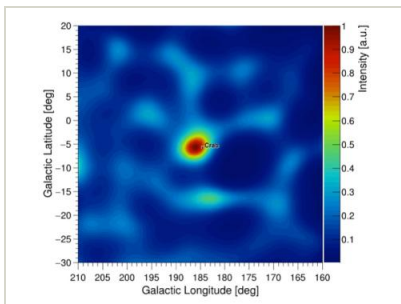


Primary U.S. Work Locations

California

Maryland

Images



First COSI GeD Image of Crab Nebula

The first COSI Image of the Crab Nebula (Kierans, et al 2017).

(<https://techport.nasa.gov/image/28213>)

Organizational Responsibility

Responsible Mission Directorate:

Mission Support Directorate (MSD)

Lead Center / Facility:

Goddard Space Flight Center (GSFC)

Responsible Program:

Center Independent Research & Development: GSFC IRAD

Project Management

Program Manager:

Peter M Hughes

Project Manager:

Keith M Jahoda

Principal Investigator:

Theresa J Brandt

Co-Investigators:

Steven E Boggs

John A Tomsick

Ian S Banks

Jentung Ku

Albert Y Shih

Omar R Quinones

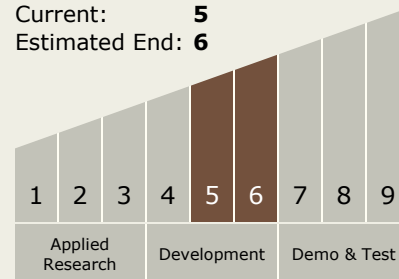
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Technology Maturity (TRL)

Start: **5**
Current: **5**
Estimated End: **6**



Technology Areas

Primary:

- TX08 Sensors and Instruments
 - └ TX08.1 Remote Sensing Instruments/Sensors
 - └ TX08.1.6 Cryogenic / Thermal

Target Destinations

Outside the Solar System,
Foundational Knowledge